BEST EVIDENCE TOPIC REPORTS

Towards evidence based emergency medicine: best BETs from the Manchester Royal Infirmary

Edited by K Mackway-Jones

Best evidence topic reports (BETs) summarise the evidence pertaining to particular clinical questions. They are not systematic reviews, but rather contain the best (highest level) evidence that can be practically obtained by busy practising clinicians. The search strategies used to find the best evidence are reported in detail in order to allow clinicians to update searches whenever necessary.

The BETs published below were first reported at the Critical Appraisal Journal Club at the Manchester Royal Infirmary.[1] Each BET has been constructed in the four stages that have been described elsewhere.[2] The BETs shown here together with those published previously and those currently under construction can be seen at http://www.bestbets.org.[3] Six topics are covered in this issue of the journal:

- Vomiting and serious head injury in children
- Low molecular weight heparin or unfractionated heparin in the treatment of patients with uncomplicated deep vein thrombosis
- Outpatient treatment for patients with uncomplicated above knee deep vein thrombosis
- SimpliRed D-dimer assay in suspected pulmonary embolus
- Elastic compression stockings and the risk of post-thrombotic syndrome in patients with symptomatic proximal vein thrombosis
- Prior injection of local anaesthetic and the pain and success of intravenous cannulation

1 Carley SD, Mackway-Jones K, Jones A, *et al*. Moving towards evidence based emergency medicine: use of a structured critical appraisal journal club. *J Accid Emerg Med* 1998;**15**:220–2.

2 Mackway-Jones K, Carley SD, Morton RJ, *et al*. The best evidence topic report: a modified CAT for summarising the available evidence in emergency medicine. *J Accid Emerg Med* 1998;**15**:222–6.

3 Mackway-Jones K, Carley SD. bestbets.org: Odds on favourite for evidence in emergency medicine reaches the worldwide web. *J Accid Emerg Med* 2000;**17**:235–6.

Vomiting and serious head injury in children

Report by Jim Barnard, *Senior House Officer*
Search checked by Simon Carley, *Specialist Registrar*

Clinical scenario

A 4 year old boy presents to the emergency department after a one metre fall onto a carpeted floor. The child has vomited three times in the past hour but is otherwise well. Clinical examination is unremarkable. You wonder how significant the vomiting is.

Three part question

In [a child with a minor head injury] does [vomiting] predict [intracranial injury]?

Search strategy

Medline 1966–07/00 using the OVID interface. ([exp brain injury OR exp craniocerebral trauma OR exp haematoma, epidural OR exp haematoma, subdural OR intracranial haematoma.mp OR head injury.mp.] AND [exp vomiting OR vomiting.mp. OR emesis.mp.] AND [child OR pediatrics OR paediatric$.mp. OR paediatric$.mp]) LIMIT to human AND English AND abstracts.

Search outcome

Altogether 53 papers were found of which 41 were irrelevant to the question or of insufficient quality for inclusion. The remaining 13 papers are shown in table 1. An additional paper of relevance was recently published in this journal, but was not currently indexed on Medline.

Comments

The papers listed in table 1 give varied opinions on the significance of vomiting following paediatric head injury, and it is difficult to draw firm conclusions. Some of the studies combine paediatric and adult cases, this is likely to lead to some bias in the reported significance of vomiting. Distinction should be

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Table 1

Author, date and country	*Patient group*	*Study type (level of evidence)*	*Outcomes*	*Key results*	*Study weaknesses*
Gorman DF, 1987, England[1]	5768 head injuries in all age groups	Retrospective case note review	Presence of skull fracture	More common in vomiting children (p<0.005)	Not specific to children
	6685 head injuries in all age groups	Prospective patient study		7% of all patients vomited 25.7% of patients with skull fracture vomited	Skull fracture is only a proxy outcome for intracranial problems
Hugenholtz H, *et al*, 1987, Canada[2]	96 children (GCS 13–15) <16 years	Prospective consecutive case series	Presence of skull fracture with GCS >12	No difference	Small sample size
	29 children (GCS 8–12) <16 years	retrospective study of case notes over the previous two years	Presence of skull fracture GCS 8–12	Less common in vomiting children	Skull fracture is only a proxy outcome for intracranial problems
Chan KH, *et al*, 1989, Hong Kong[3]	12 072 paediatric head injury cases <16 years	Retrospective case note review	Probability of IC complication with impaired conciousness + skull fracture +	62% if vomiting *v* 74% if not vomiting	Retrospective audit.
	Development of intracranial complications manifested during the first 48 hours of injury		Probability of IC complication with normal consciousness + no skull fracture +	0.08% if vomiting *v* 0.14% if vomiting	Identification of risk factors is dependant on accurate documentation (which is unlikely)
			Probability of IC complication with impaired conciousness + no skull fracture +	12% if vomiting *v* 18% if no vomiting	
			Probability of IC complication with no impaired conciousness + skull fracture +	1% if vomiting *v* 2% if no vomiting	
Ando S, *et al*, 1992, Japan[4]	147 patients with head injury, all ages analysed by age group	Prospective cohort study	Presence of skull fracture	No difference between children vomiting and not vomiting	Small study
			Presence of IC haematoma on CT	No difference between children vomiting and not vomiting	Results not specific to paediatric patients
Dietrich AM, *et al*, 1993, USA[5]	324 consecutive trauma patients in an urban childrens hospital requiring CT. Mean age 7.1 years	Prospective cohort study	Risk of IC haematoma age <2	76/191 patients with no IC lesion had vomited 10/36 patients with IC lesion had vomited	Small cohort, low event rate
			Risk of IC haematoma age >2	12/39 patients with no IC lesion had vomited 0/3 patients with IC lesion had vomited	
Duus BR, 1993, Denmark[6]	1876 patients mean age 27.5 (19.9 years)	Retrospective case note review	Presence of IC complication	1.2% if vomiting *v* 0.2% if not vomiting	Intracranial complication not defined. Retrospective All age groups
Schunk JE, *et al*, 1996, USA[7]	508 patients aged <18 undergoing CT for head trauma. 179 excluded for decreased GCS, depressed skull space, bleeding diathesis or developmental delay	Retropsective case note review	Abnormal CT findings	5.5% if vomiting *v* 3.4% if not vomiting	No protocol for CT request, inclusion based on physician request. Referral bias (major trauma centre)
Arienta C, *et al*, 1997, Italy[8]	10 000 patients with head injury aged between 6 and 95 years (median age 31)	Prospective cohort study	Abnormal CT result	4 of 213 patients with single episode of vomiting had abnormal CT result 6 of 14 patients with repeated vomiting had an abnormal CT result	Not specific to the paediatric population Low event rate
Hsiang JN, *et al*, 1997, Hong Kong[9]	1360 patients with mild head injury older than 11 years of age	Prospective cohort study	Radiographic abnormailty in GCS 13 group	4 patients with vomiting *v* 11 patients with no vomiting (p=1)	Not specific to paediatric population
			Radiographic abnormality in GCS 14 group	8 patients with vomiting *v* 16 patients with no vomiting (p=0.68)	
			Radiographic abnormailty in GCS 15 group	30 patients with vomiting *v* 93 with no vomiting (p=0.924)	
Miller EC, *et al*, 1997, United States[10]	2143 patients of all ages with a history of head injury within 2 hours of arrival at the emergency department	Prospective cohort study	Abnormal CT	15% if vomiting *v* 5% if not (p<0.001) 20% if nauseous *v* 9% if not (p<0.001)	Not specific to paediatric population
Quayle KS, *et al*, 1997, USA[11]	322 consecutive paediatric patients with head injury All patients had radiography and CT	Prospective cohort study	Odds ratio for vomiting predicting intracranial injury	1.51 (95% CI=0.67, 3.37)	Non-trivial injuries excluded. Resultant event rate for IC injury is therefore increased. Not all patients had the gold standard investigations
			Postive predictive value for vomiting predicting intracranial injury	10.9%	
			Negative predictive value for vomiting predicting intracranial injury	92.5%	

Table 1 continued

Author, date and country	*Patient group*	*Study type (level of evidence)*	*Outcomes*	*Key results*	*Study weaknesses*
Nee P, *et al*, 1999, UK[12]	5416 consecutive patients with head injury, over one year period	Prospective cohort study	Incidence of vomiting in children	12%	Skull fracture is only a proxy outcome for intracranial problems. Methods suggest that additional follow up data were collected, but it is not reported.
			Sensitivity of detecting skull fracture if child and vomiting	33.3%	
			Specificity of detecting skull fracture if child and vomiting	93.3%	
			Likelihood ratio for child and vomiting*	4.9	
Brown FD, *et al*, 2000, UK[13]	563 patients aged 0–13 with minor head injury presenting to a paediatric A+E	Prospective cohort study	Incidence of vomiting	15.8%	Only minor head injury patients included. Not all patients were radiographed or scanned. Very few patients with significant intracranial pathology
			Incidence of skull fracture	<1%	
			Incidence of skull fracture + vomiting	0%	

*Our calculation.

drawn between the identification of skull fracture and intracranial lesions. The identification of skull fracture is in itself a proxy marker for serious injury and cannot be considered a gold standard outcome. Those papers specifically looking at intracranial lesions rather than just skull fractures are also inconclusive.

Clinical bottom line

Vomiting does not seem to be an independent risk factor for skull fracture or intracranial haematoma in the paediatric population.

1 Gorman DF. The utility of post-traumatic skull X-rays. *Arch Emerg Med* 1987;**4**:141–50.
2 Hugenholtz H, Izukawa D, Shear P, *et al*. Vomiting in children following head injury. *Childs Nerv Syst* 1987;**3**:266–70.
3 Chan KH, Yue CP, Mann KS. The risks of intracranial complications in paediatric head injury. *Childs Nerv Syst* 1990;**6**:27–9
4 Ando S, Otani M, Moritake K. Clinical analysis of post-traumatic vomiting. *Acta Neurochir (Wien)* 1992;**119**: 97–100.
5 Dietrich AM, Bowman MJ, Ginn-Pease ME, *et al*. Pediatric head injuries: can clinical factors reliably predict an abnormality on computed tomography. *Ann Emerg Med* 1993;**22**: 1535–40.
6 Duus BR, Boesen T, Kruse KV, *et al*. Prognostic signs in the evaluation of patients with minor head injury. *Br J Surg* 1990;**80**:988–91.
7 Schunk JE, Rodgerson JD, Woodward GA. The utility of head computed tomogrpahic scranning in paediatric patients with normal neurological examination in the emergency department. *Paed Emerg Care* 1996;**12**:160–5.
8 Arienta C, Caroli M, Balbi S. Management of head injured patients in the emergency department: a practical protocol. *Surg Neurol* 1997;**48**:213–19.
9 Hsiang JN, Yeung T, Yu AL, *et al*. High risk mild head injury. *J Neurosurg* 1997;**87**:234–8.
10 Miller EC, Homes JF, Derlet RW. Utilizing clinical factors to reduce head CT scan ordering for minor head trauma patients. *J Emerg Med* 1997;**15**:453–7.
11 Quayle KS, Jaffe DM, Kupperman N, *et al*. Diagnostic testing for acute head injury in children: when are head computed tomography and skull radiographs indicated? *Pediatrics* 1997;**99**:E11.
12 Nee P, Hadfield JM, Yates DW, *et al*. Signficance of vomiting after head injury. *J Neurol Neurosurg Psychiatry* 1999;**66**: 470–3.
13 Brown FD, Brown J, Beattie TF. Why do children vomit after minor head injury? *J Accid Emerg Med* 2000;**17**:268–71.

Low molecular weight heparin or unfractionated heparin in the treatment of patients with uncomplicated deep vein thrombosis

Report by Beverley Lane, *Research Nurse*
Search checked by Magnus Harrison, *Research Fellow*

Clinical scenario

A 60 year old man presents with a three day history of pain in his left calf. You suspect an above knee deep vein thrombosis (DVT), which is later confirmed by ultrasound. You are considering admitting this man for treatment with unfractionated heparin (UH), when one of your colleagues mentions that low weight molecular weight heparins (LMWH) have been proven to be as good at treating thromboembolic disease and its complications. You wonder whether this is true.

Three part question

In [patients with deep vein thrombosis] is [low molecular weight heparin as good as unfractionated heparin} at {treating uncomplicated proximal DVT]?

Search strategy

Medline 1966–07/00 using the OVID interface. (Exp venous thrombosis OR deep vein thrombosis.mp) OR dvt.mp) OR [(exp thrombosis or thrombosis.mp) AND (exp veins OR Vein$.mp)] AND (exp. heparin, low molecular weight OR low molecular weight heparin.mp) NOT (prophylaxis.mp OR primary prevention.mp) LIMIT to human AND english language.

Search outcome

Altogether 373 papers identified of which 369 were irrelevant or of insufficient quality for inclusion. The remaining four papers are shown in table 2.

Comments

There are four well designed trials in this area. All come to the same conclusion.

Clinical bottom line

Low molecular weight heparin is as effective and safe as unfractionated heparin and should be the form of treatment for patients with uncomplicated proximal deep vein thrombosis.